

**Unalakleet River
Test Net Project, 1989**

by

**Fred Bue
and
Charles Lean**

Regional Information Report¹ No. 3N90-07

**Alaska Department of Fish and Game
Division of Commercial Fisheries, AYK Region
333 Raspberry Rd.
Anchorage, Alaska 99518-1599**

February 1990

'The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES.....	ii
LIST OF FIGURES.....	iii
LIST OF APPENDICES.....	iv
INTRODUCTION.....	1
METHODS.....	1
Project Deployment.....	1
Test Fishing.....	1
Catch Sampling.....	2
Subsistence Survey.....	2
RESULTS.....	3
Test Fishing.....	3
Catch Sampling.....	3
Subsistence Survey.....	3
DISCUSSION.....	4
LITERATURE CITED.....	5
APPENDICES.....	17

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Age, sex, and length (mm) of chinook salmon sampled from Norton Sound commercial and test fisheries, 1989.....	6
2. Age, sex, and length (mm) of coho salmon sampled from Norton Sound commercial and test fisheries, 1989.....	7
3. Age, sex, and length (mm) of chum salmon sampled from Norton Sound commercial and test fisheries, 1989.....	8
4. Unalakleet River and Unalakleet subdistrict subsistence catch and effort 1982-1989.	9
5. Mean dates of commercial and test fish CPUE, Unalakleet subdistrict, Norton Sound District, 1981-1989.....	12
6. Comparison of commercial catch and escapement data for the Unalakleet subdistrict, Norton Sound District, 1981-1989. 13	

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Site locations of Unalakleet River escapement projects, Norton Sound District, 1989.....	14
2. Comparisons of commercial and test fish cumulative CPUE for each salmon species by year as a percent of the previous 5-year averages (1984-1988). Unalakleet subdistrict, Norton Sound District, 1989.....	15
3. Commercial and test fish cumulative proportion curves showing run timing of salmon by date. Unalakleet sub- district, Norton Sound District, 1989.....	16

LIST OF APPENDICES

<u>Appendix</u>	<u>Page</u>
1. Unalakleet test net catches of chinook salmon in 5 7/8" gear, 1982-1989.....	18
2. Unalakleet test net catches of coho salmon in 5 7/8" gear, 1981-1989.....	21
3. Unalakleet test net catches of pink salmon in 5 7/8" gear, 1981-1989.....	25
4. Unalakleet test net catches of chum salmon in 5 7/8" gear, 1981-1989.....	29

INTRODUCTION

The Unalakleet River system empties into Norton Sound approximately 130 miles from the Nulato Hills westward to the Bering Sea and drains an area of 1,087 square miles. Five major tributaries comprise the system, all of which support spawning salmon.

The town of Unalakleet is situated at the mouth of the Unalakleet River, the most important salmon producing river in Norton Sound. Historically, the people of the area have depended on the salmon runs, both for subsistence needs and as the basis of their cash economy.

Attempts to assess salmon escapement have included aerial surveys, inseason subsistence surveys, test fishing, counting towers, and side scan sonar. Inseason subsistence surveys have been used to assess timing, magnitude and the duration of the chinook salmon return (Bue and Lean 1988, and Lean 1986a, 1987). A counting tower was used on the North River, an important tributary for three years (Lean 1985a, 1986b, 1987b). Hydroacoustic counting techniques have been used unsuccessfully in three prior years (Lean and Peterson 1983, 1984 and 1985). Test fishing with set gill nets in the river has been utilized since 1981 to provide an index of return strength by species (Lean and Peterson 1982, 1983, 1984, 1985; Lean 1986a, 1987a, 1989; Bue and Lean, 1988). This report presents test fishing results from the 1989 season.

METHODS

Project Deployment

Test fishing began June 12 and ended September 13. The same site has been used since 1981 and is located approximately three miles upstream from the Unalakleet River mouth on the north bank (Figure 1). Chinook salmon subsistence fishermen were interviewed daily from June 7 to June 28.

Test Fishing

Similar gear for set gillnet test fishing has been used since 1981. Nets with mesh size 5 7/8" stretch measure and 20 fathoms in length were fished exclusively this season. All nets were made of multifilament nylon #63 (210/18) twine, light green in color with cork lines of 1/2 inch braided nylon stretch measure and "Spongex" floats at 30 inch intervals. Lead lines consisted of braided lead core line with a weight of 95 pounds per 100 feet. All nets were hung at a 2:1 ratio.

An effort has been made over the past eight seasons to use standard technique in setting the nets. The crew has picked landmarks and tried to set the net in line with a willow bush that serves as the on shore anchor and the downstream

point of an island offshore from the net site. The standard nets have been cut to 20 fathoms length which causes the net to cover the northern half of that river channel.

The test net was fished throughout the season with one day, usually Sunday, taken off each week. Test fishing days were 24 hours in duration and began at 9:00 a.m. The gill nets were normally picked twice daily and more often to prevent fish or debris saturation. Occasionally the net was left unchecked for more than 24 hours to collect data on days off during peak migration periods.

All fish caught in the test net were delivered to Martha Nanouk, a local subsistence fisher, as per agreement for the use of her traditional set net site. When Mrs. Nanouk did not want fish, she would decide who to give them to among the village elders. From the daily catch and time fished a daily catch per unit effort (CPUE) of catch/100 fathom/hours could be calculated for each species. Cumulative CPUE (calculated as cumulative catch/100 fathom/cumulative hours) was calculated beginning with the first chinook salmon captured, and the tenth pink, coho, and chum salmon, to compensate for fishing time expended prior to the beginning of the salmon runs.

Catch Sampling

Commercial catch sampling goals were 150 chinook salmon from both Unalakleet and Shaktoolik subdistricts, 300 coho salmon and 450 chum salmon from the Unalakleet subdistrict. Chum salmon were to be collected in three strata sampling periods from June 25 to July 28 at the rate of 150 samples per period.

Age, sex and length data were collected from all chinook, coho and chum salmon caught in the test net. Pink salmon were only counted. Data were recorded on standard "mark sense" data entry forms. Scales were mounted on gum cards and pressed on acetate cards. Aging was done by Gary Kneupfer and Charles Lean in Kotzebue by projecting the scale impression on a microfiche reader. Three scales were taken from each chinook and coho to compensate for regenerated and unreadable scales. Only one scale was required from chum salmon. Test fish catch sampling was done outside the bunk house and the fish were distributed to subsistence users soon after.

Subsistence Survey

One to six subsistence fishermen were interviewed daily from June 7 to July 28 as an additional index of the chinook run. Fishermen were chosen for reliability and willingness to share catch information. Mean daily catches and locations were compared daily in an effort to track the movement and magnitude of the chinook run.

RESULTS

Test Fishing

A total of 45 chinook (71% male, 29% female), 191 coho (47% male, 53% female), 1,259 pink and 728 chum (61% male, 39% female) salmon were captured in the test nets from June 12 to September 13. Based on daily CPUE, peak salmon passage occurred on June 20 for chinook, August 14 for coho, July 19 for pinks and July 25 for chum salmon. Daily CPUE data is presented in Appendices 1-4.

Appendices 1-4 show the standardized cumulative CPUE for salmon caught in the Unalakleet River tests net. All CPUE values shown in these tables are calculated using the same method. The 1981 catch and CPUE are not comparable to subsequent years because of fishing site conflicts during July and August with the Nanouk family.

Comparative catch statistics show that 1989 chinook and coho salmon cumulative CPUE catch rates were 41% and 3% below the previous 5-year averages respectively (1984-88). Chum salmon catches were 10% above average. Catch data indicates that pink salmon are on an odd-even year cycle with odd year returns typically much weaker than even year returns. However, the 1989 pink catches were the second highest since test fishing became standardized in 1982.

Catch Sampling

Commercial catch sampling produced 138 ageable chinook salmon, 156 coho salmon and 445 chum salmon samples from the Unalakleet subdistrict. Tables 1-3 present the age, sex and length data collected by project staff in both the commercial and test gear types. Male chinook salmon comprised the greatest percentage in both fisheries while female chinook tend to be larger than males in the same year class. Overall the test fishery caught slightly smaller chinook salmon than the commercial fishery which can be attributed to the use of smaller mesh size. Coho salmon were primarily 4 year old fish where females comprised 45% of the commercial samples and 54% of the test fish samples. Four and five year old chum salmon appeared approximately in equal proportions in both fisheries with males predominant in the test fishery.

Subsistence Survey

The inseason subsistence surveys conducted during the chinook salmon subsistence fishery showed fishing effort in the Unalakleet River mouth area to be the lowest since net counting began in 1985 (Table 4). Apparently subsistence fishermen have reversed the recent trend by moving their effort back to the ocean. Less debris from spring run off is encountered and commercial fishermen have a chance to test out gear before the commercial fishing season starts. Subsistence fishing for other salmon species appeared fairly low. The summer was very wet so few people attempted to put up dry fish. Seining currently seems to be the most popular fishing method in the Unalakleet River especially when there is a lot of debris.

DISCUSSION

The 1984 project report presented all the tests catches to that time. This project now serves as an index of escapement so only 5 7/8" test nets are used and only historic data from that mesh size is presented here for comparison. The other mesh sizes have been dropped since the test net catches are no longer used to apportion sonar counts by species.

Comparisons of cumulative CPUE by year for each salmon species show a correlation between the commercial and test fisheries (Figure 2). Both commercial CPUE and test fish CPUE indices are useful management tools when combined with run timing data (Table 5 and 6, Figure 3, and Appendices 1-4). An example would be the coho run in 1985 when it became evident that the run was weak from comparing catch rates with catches from the same time in previous years. Commercial fishing time was reduced which resulted in a near average test fish CPUE by the end of the season.

Currently an escapement index has not yet been fully developed. Tower counts and aerial surveys for the North River are too few and inconsistent to provide an adequate data base for annual comparisons or comparisons with other indices (Table 6). Furthermore, it is not known how the North River compares to the entire Unalakleet River system. Presently the best index of escapement for the Unalakleet River system is thought to be the test fish project which can now be used to evaluate the relative size of returns from recent brood years.

Commercial catch sampling goals were reduced this year and were met for all categories except Shaktoolik catches which were strictly on an opportunistic basis. Chinook salmon were flown from Shaktoolik to Unalakleet already packed in ice and were stored at the Unalakleet airport until they could be shipped out. Consequently there was little opportunity to obtain the desired samples.

The low level of subsistence fishing effort in the Unalakleet River this year made it difficult to obtain interviews of fishermen who actually fished in the river. Since subsistence chinook salmon catches in the ocean are larger and appear to be replacing the river subsistence catches, both river and ocean fishermen should be interviewed.

LITERATURE CITED

- Bue, F. and C. Lean. 1988. Unalakleet River Test Net Project, 1987. Regional information Report 3N88-07. Alaska Department of Fish and Game, Commercial Fisheries Division, Anchorage.
- Lean, C.F. 1985a. 1984 North River Salmon Counting Tower. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 34. Nome.
- _____. 1985b. 1984 Unalakleet River Sonar Feasibility. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 36. Nome.
- _____. 1986a. 1985 Unalakleet River Test Fishing Project. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 43. Nome.
- _____. 1986b. 1985 North River Salmon Counting Tower. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 42. Nome.
- _____. 1987a. 1986 Unalakleet River Test Fishing Project. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 46. Nome.
- _____. 1987b. 1986 North River Salmon Counting Tower. AYK Region, Norton Sound/Kotzebue Escapement Report # 47. Nome.
- _____. 1989. Unalakleet River Test Net Project, 1988. Regional Information Report 3N89-14. Alaska Department of Fish and Game, Commercial Fisheries Division, Anchorage.
- Lean and Peterson. 1982. 1981 Unalakleet River Escapement Studies. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 26. Nome.
- _____: 1983. 1982 Unalakleet River Escapement Project. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 30. Nome.
- _____: 1984. 1983 Unalakleet River Escapement Project. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 32. Nome.
- _____: 1985. 1984 Unalakleet River Test Fishing Project. AYK Region, Norton Sound/Kotzebue Salmon Escapement Report # 35. Nome.

Table 1. Age, sex, and length (mm) of chinook salmon sampled from Norton Sound commercial and test fisheries, 1989.

	Brood Year and Age Group				
	1985 1.2	1984 1.3	1983 1.4	1982 1.5	Totals
Unalakleet (Subdistrict 6) Commercial GN					
Females	0	18	35	5	58
Percent	0.0	13.0	25.4	3.6	42
Mean Length	-	791	855	920	841
Std. Error 1/	-	13.0	8.9	25.9	
Males	18	35	27	0	80
Percent	13.0	25.4	19.6	0.0	58
Mean Length	553	737	833	-	728
Std. Error 1/	9.0	11.9	16.9	-	
Sexes Combined	18	53	62	5	138
Percent	13.0	38.4	44.9	3.6	100
Mean Length	553	755	845	920	776
Shaktoolik (Subdistrict 5) Commercial GN					
Females	0	3	5	0	8
Percent	0.0	23.1	38.5	0.0	62
Mean Length	-	728	911	-	842
Std. Error 1/	-	43.1	29.4	-	
Males	1	3	1	0	5
Percent	7.7	23.1	7.7	0.0	38
Mean Length	585	710	910	-	725
Std. Error 1/	0.0	15.8	0.0	-	
Sexes Combined	1	6	6	0	13
Percent	7.7	46.2	46.2	0.0	100
Mean Length	585	719	911	-	797
Unalakleet River Test GN 2/					
Females	0	5	6	1	12
Percent	0.0	12.2	14.6	2.4	29
Mean Length	-	825	863	865	847
Std. Error 1/	-	30.0	19.0	0.0	
Males	5	17	7	0	29
Percent	12.2	41.5	17.1	0.0	71
Mean Length	477	697	818	-	688
Std. Error 1/	53.3	11.8	19.2	-	
Sexes Combined	5	22	13	1	41
Percent	12.2	53.7	31.7	2.4	100
Mean Length	477	726	839	865	735

1/ Standard error of mean length.

2/ Gill net mesh size was 5-7/8" stretch measure.

Table 2. Age, sex, and length (mm) of coho salmon sampled from Norton Sound commercial and test fisheries, 1989.

Brood Year and Age Group				
	1986	1985	1984	
	1.1	2.1	3.1	Totals

Unalakleet (Subdistrict 6) Commercial GN

Females	0	63	8	71
Percent	0.0	40.4	5.1	45.5
Mean Length	-	572	578	573
Std. Error 1/	-	4.4	5.3	
Males	0	79	6	85
Percent	0.0	50.6	3.8	54.5
Mean Length	-	578	575	578
Std. Error 1/	-	4.5	20.2	
Sexes Combined	0	142	14	156
Percent	0.0	91.0	9.0	100.0
Mean Length	-	575	577	575

Unalakleet River Test GN 2/

Females	1	72	3	76
Percent	0.7	50.7	2.1	53.5
Mean Length	543	574	559	573
Std. Error 1/	0	3.5	19.3	
Males	0	65	1	66
Percent	0.0	45.8	0.7	46.5
Mean Length	-	574	600	574
Std. Error 1/	-	4.9	0.0	
Sexes Combined	1	137	4	142
Percent	0.7	96.5	2.8	100.0
Mean Length	543	574	569	574

1/ Standard error of mean length.

2/ Gill net mesh size was 5-7/8" stretch measure.

Table 3. Age, sex, and length (mm) of chum salmon sampled from Norton Sound commercial and test fisheries, 1989.

	Brood Year and Age Group				
	1986 0.2	1985 0.3	1984 0.4	1983 0.5	Totals
Unalakleet (Subdistrict 6) Commercial GN					
Females	0	97	109	0	206
Percent	0.0	22.0	24.4	0.0	46
Mean Length	-	556	586	-	572
Std. Error 1/	-	2.1	2.2	-	
Males	0	150	88	1	239
Percent	0.0	33.6	19.7	0.2	54
Mean Length	-	578	614	575	591
Std. Error 1/	-	2.1	3.3	0.0	
Sexes Combined	0	247	197	1	445
Percent	0.0	55.6	44.2	0.2	100
Mean Length	-	569	599	575	581
Shaktoolik (Subdistrict 5) Commercial GN					
Females	0	28	29	2	59
Percent	0.0	17.6	18.2	1.3	37
Mean Length	-	574	594	589	584
Std. Error 1/	-	3.4	4.7	39.0	
Males	0	54	40	6	100
Percent	0.0	34.0	25.2	3.8	63
Mean Length	-	585	627	615	604
Std. Error 1/	-	3.4	5.2	12.1	
Sexes Combined	0	82	69	8	159
Percent	0.0	51.6	43.4	5.0	100
Mean Length	-	581	613	608	597
Unalakleet River Test GN 2/					
Females	1	118	160	8	287
Percent	0.1	16.2	22.0	1.1	39
Mean Length	548	574	596	599	587
Std. Error 1/	0.0	2.2	1.9	11.2	
Males	0	229	208	3	440
Percent	0.0	31.5	28.6	0.4	61
Mean Length	-	586	620	622	602
Std. Error 1/	--	1.8	2.0	15.0	
Sexes Combined	1	347	368	11	727
Percent	0.1	47.7	50.6	1.5	100
Mean Length	548	581	608	605	596

1/ Standard error of mean length.

2/ Gill net mesh size was 5-7/8" stretch measure.

Table 4. Unalakleet River and Unalakleet subdistrict subsistence catch and effort 1982-1989. 1/

	1982			1983			1984		
DATE	# fisherman	# daily	mean	# fisherman	# daily	mean	# fisherman	# daily	mean
6/06									
6/07									
6/08				4	3	0.8			
6/09				4	1	0.2			
6/10				4	7	1.8			
6/11				4	2	0.5			
6/12				4	2	0.5			
6/13				4	0	0.0			
6/14	2	4	2.0	4	1	0.2			
6/15	3	0	0.0	4	23	5.8			
6/16	4	5	1.2	4	37	9.2			
6/17	3	5	1.7	4	25	6.2			
6/18	5	9	1.8	4	29	7.2			
6/19	6	9	1.5	4	29	7.2			
6/20	6	10	1.7	4	17	4.2			
6/21	5	10	2.0	4	11	2.8			
6/22	4	3	0.8	4	21	5.2			
6/23	4	7	1.8	4	24	6.0	3	1	0.3
6/24	4	6	1.5	4	25	6.2	4	5	1.2
6/25	4	13	3.2	3	6	2.0	5	18	3.6
6/26	4	2	0.5	3	14	4.7	5	13	2.6
6/27	3	3	1.0	3	15	5.0	4	20	5.0
6/28	3	9	3.0	4	14	3.5	5	66	13.2
6/29	3	8	2.7	4	10	2.5	5	22	4.4
6/30	4	7	1.8	4	6	1.5	5	25	5.0
7/01	5	16	3.2				4	33	8.2
7/02	6	41	6.8				3	41	13.7
7/03	5	73	14.6				2	16	8.0
7/04	4	40	10.0				2	9	4.5
7/05	3	24	8.0				2	16	8.0
7/06	3	27	9.0						
7/07	4	21	5.2						
7/08	3	3	1.0						
7/09	3	16	5.3						
7/10	3	2	0.7						
7/11	4	10	2.5						
7/12	2	2	1.0						
7/13	2	0	0.0						
7/14									
7/15									
7/16									
7/17									

-continued-

Table 4. (p. 2 of 3).

	1985				1986				1987			
DATE	# fish-ermen	# daily king	# nets mean	observed	# fish-ermen	# daily king	# nets mean	observed	# fish-ermen	# daily king	# nets mean	observed
6/06												
6/07												
6/08												
6/09												
6/10												
6/11												
6/12												
6/13												
6/14												
6/15												
6/16												
6/17												7
6/18									1	0	0.0	10
6/19								14	2	1	0.5	14
6/20								19	2	2	1.0	16
6/21					6	27	4.5	21	3	7	2.3	
6/22					6	22	3.7	21	3	3	1.0	17
6/23					5	13	2.6	16	5	3	0.6	18
6/24					5	34	6.8	16	3	4	1.3	19
6/25					6	93	15.5	15	3	8	2.7	20
6/26	4	1	0.2	16	3	87	29.0	20	1	1	1.0	22
6/27	4	2	0.5	16	3	38	12.7	21	4	12	3.0	22
6/28	4	2	0.5	19	1	9	9.0	19	5	56	11.2	21
6/29	4	9	2.2	19	5	8	1.6	16	7	60	8.6	22
6/30	5	78	15.6	16	4	9	2.2	15	6	29	4.8	15
7/01	3	37	12.3	13	4	11	2.7	10	7	57	8.1	23
7/02	3	19	6.3	12	3	5	1.7	7	6	8	1.3	26
7/03	3	19	6.3	11	2	2	1.0	6	4	9	2.3	22
7/04	3	20	6.7	12					3	2	0.7	22
7/05	4	31	7.8	13							0.0	
7/06	4	5	1.2	12					4	11	2.8	17
7/07	3	14	4.7						2	5	2.5	19
7/08	3	43	14.3	11					2	4	2.0	17
7/09	4	44	11.0	10					2	1	0.5	18
7/10	3	12	4.0	11					2	0	0.0	9
7/11	3	7	2.3	9					1	5	5.0	13
7/12	3	7	2.3	10					1	6	6.0	
7/13	3	9	3.0	11					1	0	0.0	9
7/14	4	3	0.8	10							0.0	10
7/15	3	11	3.7	12					1	0	0.0	10
7/16												
7/17												

-continued-

Table 4. (p. 3 of 3).

DATE	1988				1989 River				1989 Ocean			
	# fishermen	# king	daily mean	# nets observed	# fishermen	# king	daily mean	# nets observed	# fishermen	# king	daily mean	
6/06	3	5	1.7	10						1	6	6.0
6/07										1	1	1.0
6/08	3	0	0.0	9						4	23	5.8
6/09	1	0	0.0	10						4	54	13.5
6/10				10								
6/11	4	6	1.5	12						1	35	35.0
6/12								5		3	43	14.3
6/13	2	0	0.0	5	1	0	0.0	5		3	14	4.7
6/14	1	0		7				6		6	113	18.8
6/15	1	0	0.0	15				5		1	30	30.0
6/16	2	1	0.5	15				7				
6/17	2	1	0.5	15								
6/18	1	5	5.0	14								
6/19												
6/20	2	3	1.5	10	3	22	7.3	7		1	1	1.0
6/21	4	24	6.0	10	3	7	2.3	7				
6/22	3	37	12.3	12	2	2	1.0	8				
6/23	1	6	6.0	15	3	18	6.0	12				
6/24				15	4	27	6.8	14				
6/25	1	9	9.0	13								
6/26												
6/27				14	1	7	7.0	5				
6/28					1	1	1.0	8				
6/29								10				
6/30												
7/01								9				
7/02												
7/03												
7/04								4				
7/05								3				
7/06								4				
7/07								7				
7/08								0				
7/09												
7/10												
7/11								1				
7/12								1				
7/13								1				
7/14								1				
7/15								1				
7/16												
7/17												

1/ Only a selected number of fishermen were interviewed, therefore catch and effort data presented here do not represent the total for the Unalakleet River. Net counts began in 1985.

Table 5. Mean dates of commercial and test fish CPUE, Unalakleet
Subdistrict, Norton Sound District, 1981-1989.

	Chinook		Coho		Chum		Pink
	C/F	T/F	C/F	T/F	C/F	T/F	T/F
1981	6/20		8/15	8/19	7/18	7/29	7/22
1982	6/23	6/23	8/14	9/01	7/17	7/13	7/07
1983	6/25	6/20	8/13	9/04	7/14	7/20	7/12
1984	6/29	7/05	8/15	8/22	7/18	7/16	7/11
1985	7/06	7/08	8/21	8/21	7/24	7/09	7/17
1986	6/28	6/26	8/13	8/14	7/16	7/23	7/02
1987	6/26	7/07	8/15	8/24	7/11	7/23	7/21
1988	6/24	6/24	8/13	8/12	7/13	7/22	7/05
1989	6/20	6/18	8/09	8/15	7/12	7/11	7/18
Previous Season	6/27	6/24	8/15	8/22	7/16	7/19	7/12
Averages							

Table 6. Comparison of commercial catch and escapement data for the Unalakleet subdistrict, Norton Sound District, 1981-1989.

Commercial Fishery 1/			Escapement 2/			
Year	Catch	Cum. CPUE	Test Catch	Test Cum. CPUE	North River Tower	North River Aerial
CHINOOK						
1981	6157					
1982	3768	0.2	22	0.64		8
1983	7022	0.3	18	0.42		347
1984	6804	0.7	41	0.85	2844	51
1985	12621	1.1	171	1.60	1426	703
1986	4494	0.3	49	0.42	1613	
1987	3246	0.3	42	0.34		445
1988	2218	0.2	13	0.19		
1989	4402	0.4	45	0.40		
1984-1988						
Average	5877	0.5	63	0.68		
COHO						
1981	29845	1.4	310	0.81		263
1982	61343	2.2	235	1.89		4145
1983	36098	1.6	184	1.12		
1984	47904	1.7	244	1.56		152
1985	15421	0.5	175	1.15	2045	
1986	20580	1.0	134	0.82		
1987	15097	1.1	133	0.88		680
1988	24265	1.0	178	0.93		
1989	36025	1.6	193	0.98		
1984-1988						
Average	24653	1.1	173	1.07		
CHUM						
1981	39186	0.8	1102	2.83		599
1982	44520	1.1	330	1.98		4135
1983	109220	2.4	547	2.30		
1984	43317	1.3	626	2.79	2915	1625
1985	25111	0.9	819	2.30	4567	
1986	29136	1.2	774	2.74	3738	
1987	17525	0.8	608	1.71		392
1988	25364	0.8	494	1.53		
1989	20825	0.6	736	2.42		
1984-1988						
Average	28091	1.0	664	2.21		

1/ 1986 commercial chum catch and Cum. CPUE through August 9.

2/ 1986 North River Tower count through July 18.

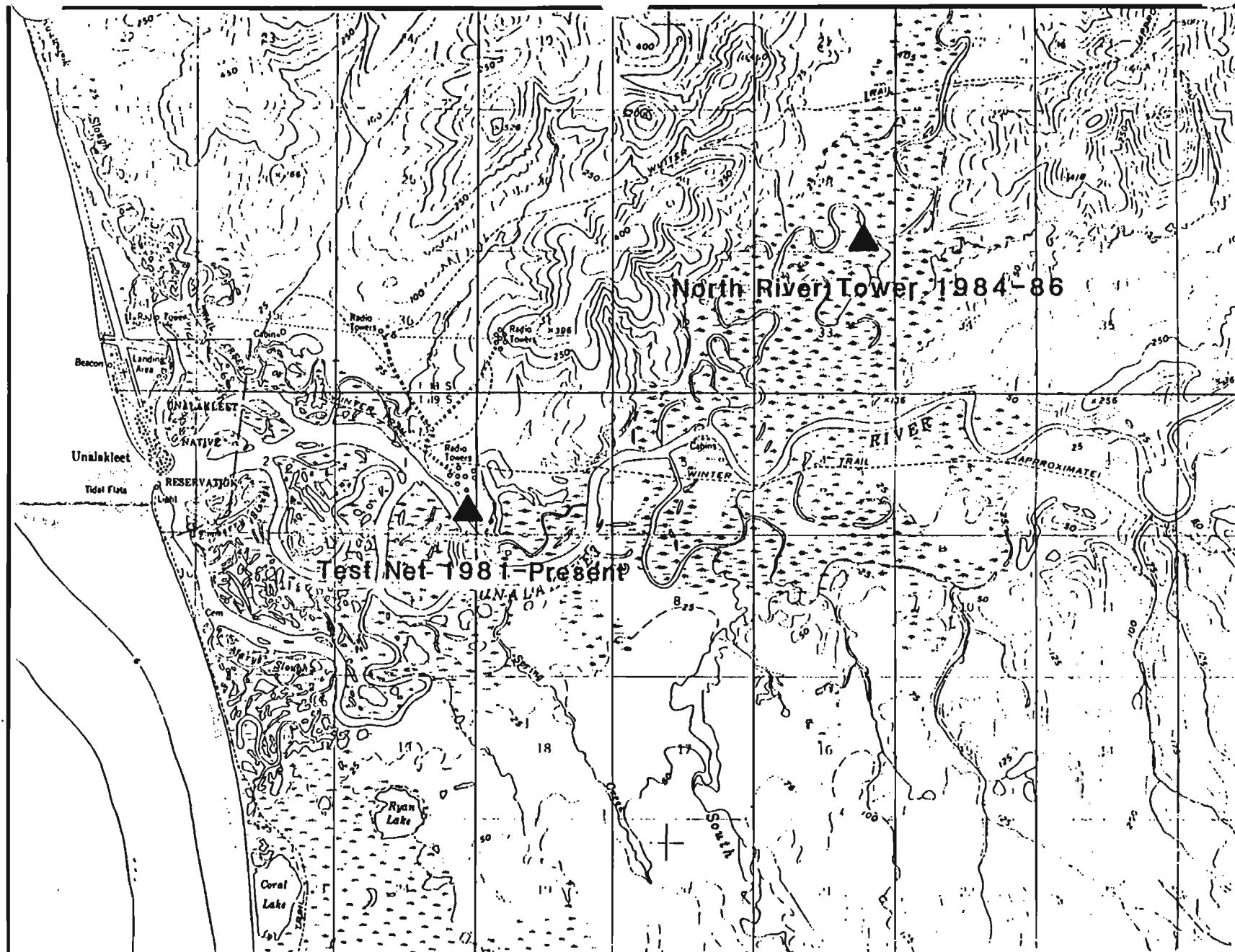


Figure 1. Site locations of Unalakleet River escapement projects, Norton Sound District, 1989.

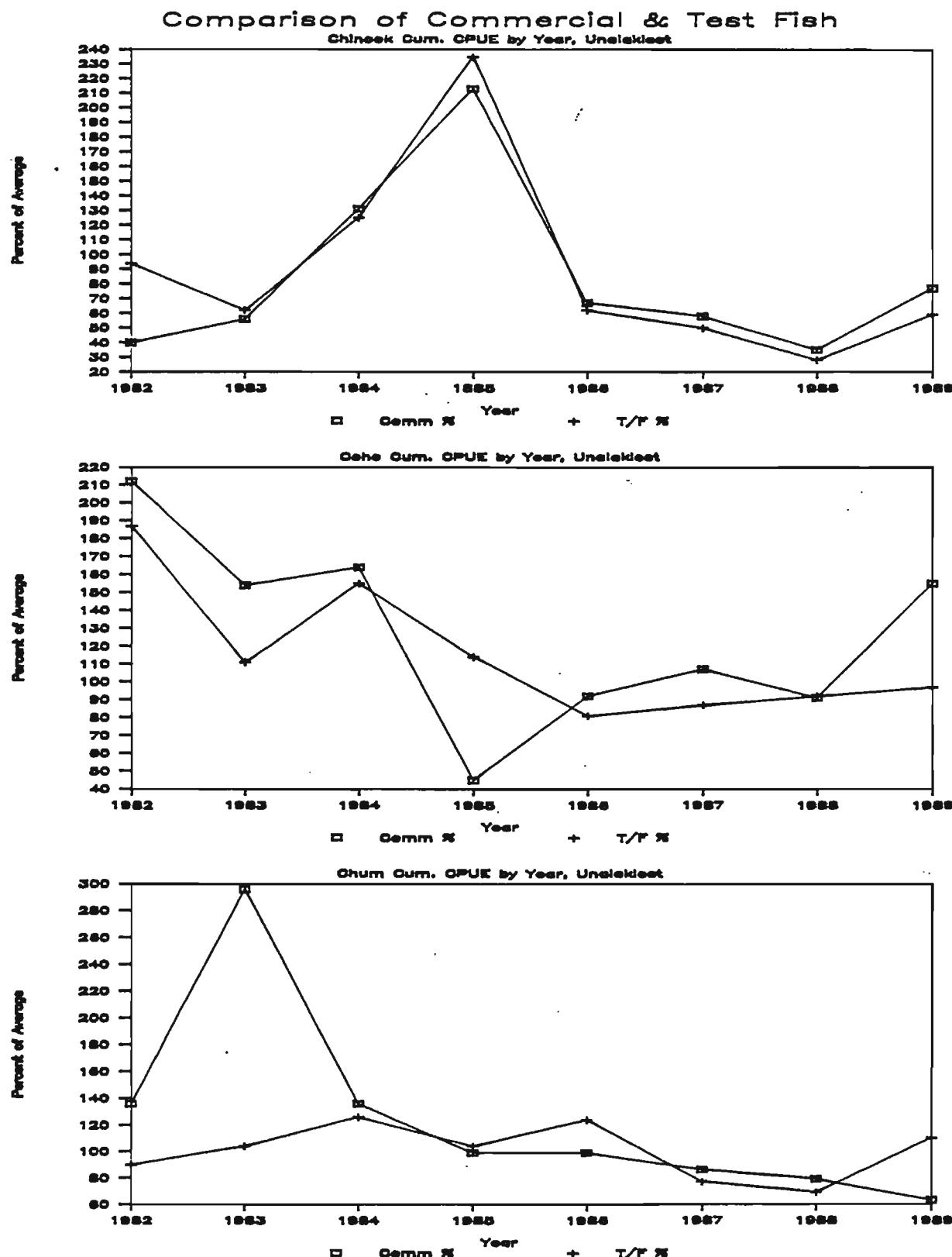


Figure 2. Comparisons of commercial and test fish cumulative CPUE for each salmon species by year as a percent of the previous 5-year averages (1984-1988). Unalakleet subdistrict, Norton Sound District, 1989.

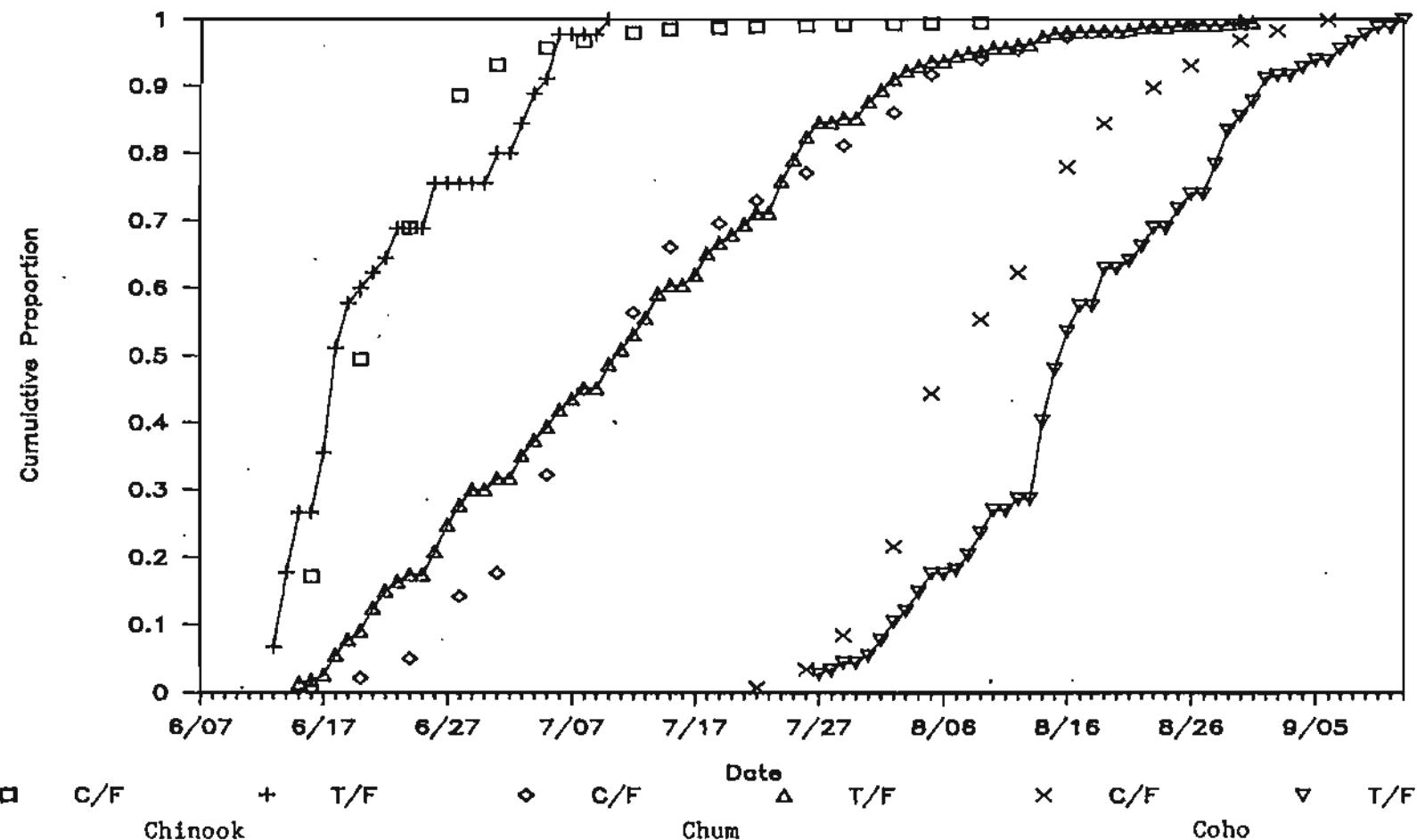


Figure 3. Commercial and test fish cumulative proportion curves showing run timing of salmon by date. Unalakleet subdistrict, Norton Sound District, 1989.

APPENDICES

Appendix Table 1. (p. 3 of 3).

	chinook salmon catch, 1988 counts begin the day the first salmon was caught					chinook salmon catch, 1989 counts begin the day the first salmon was caught				
Date	Hours	Catch	CPUE	Cum. CPUE	CP(C)	Hours	Catch	CPUE	Cum. CPUE	CP(C)
6/07										
6/08										
6/09										
6/10										
6/11										
6/12				22.5	0	0.00				
6/13				23.5	3	0.64	0.64	0.07		
6/14				24.0	5	1.04	0.84	0.18		
6/15				24.0	4	0.83	0.84	0.27		
6/16				23.9	0	0.00	0.63	0.27		
6/17				24.0	4	0.83	0.67	0.36		
6/18				24.0	7	1.46	0.80	0.51		
6/19				24.8	3	0.60	0.77	0.58		
6/20	24.3	1	0.21	0.21	0.077	22.3	1	0.22	0.71	0.60
6/21	23.9	2	0.42	0.31	0.231	23.8	1	0.21	0.65	0.62
6/22	24.0	3	0.63	0.42	0.462	24.0	1	0.21	0.61	0.64
6/23	24.2	0	0.00	0.31	0.462	24.0	2	0.42	0.59	0.69
6/24	23.7	1	0.21	0.29	0.538	11.0	0	0.00	0.57	0.69
6/25	9.0	0	0.00	0.27	0.538	0.0		0.00	0.57	0.69
6/26				0.00	0.27	0.538	23.8	3	0.63	0.57
6/27	24.1	1	0.21	0.26	0.615	24.0	0	0.00	0.53	0.76
6/28				0.00	0.26	0.615	24.0	0	0.00	0.49
6/29	53.0	1	0.09	0.22	0.692	24.0	0	0.00	0.46	0.76
6/30	19.1	0	0.00	0.20	0.692			0.00	0.46	0.76
7/01	24.2	0	0.00	0.18	0.692	34.8	2	0.29	0.45	0.80
7/02	10.3	1	0.49	0.19	0.769	0.0		0.00	0.45	0.80
7/03				0.00	0.19	0.769	24.1	2	0.41	0.44
7/04	24.2	0	0.00	0.18	0.769	24.0	2	0.42	0.44	0.89
7/05	24.0	2	0.42	0.19	0.923	23.9	1	0.21	0.43	0.91
7/06	24.0	0	0.00	0.18	0.923	24.1	3	0.62	0.44	0.98
7/07	24.1	0	0.00	0.17	0.923	24.0	0	0.00	0.42	0.98
7/08	23.9	1	0.21	0.17	1.000	10.0	0	0.00	0.41	0.98
7/09	11.6	0	0.00	0.17	1.000	0.0		0.00	0.41	0.98
7/10				0.00	0.17	1.000	24.1	1	0.21	0.40
7/11	24.4	0	0.00	0.16	1.000					
7/12	23.9	0	0.00	0.15	1.000					
7/13	23.9	0	0.00	0.14	1.000					
7/14	23.9	0	0.00	0.13	1.000					
7/15	24.1	0	0.00	0.13	1.000					
7/16	10.8	0	0.00	0.12	1.000					
7/17				0.00	0.12	1.000				
7/18	24.1	0	0.00	0.12	1.000					
7/19	24.0	0	0.00	0.11	1.000					
7/20	24.0	0	0.00	0.11	1.000					
7/21	24.2	0	0.00	0.11	1.000					
7/22	24.0	0	0.00	0.10	1.000					
7/23	25.4	0	0.00	0.10	1.000					
7/24				0.00	0.10	1.000				
7/25				0.00	0.10	1.000				
7/26				0.00	0.10	1.000				
Totals										
	668.3	13	2.87			580.0	45	9.26		
	Mean day catch 6/24					Mean day catch 6/18				

Appendix Table 2. (p. 1 of 4).

DATE	Hours	Coho salmon catch, 1987				Coho salmon catch, 1988					
		Catch	CPE	CPE	CPI/C	DATE	Hours	Catch	CPE	CPE	CPI/C
7/25									0.88	0.89	0.899
7/26									0.88	0.89	0.899
7/27							1	0.87	0.88	0.888	
7/28							3	0.86	0.86	0.872	
7/29							2	0.86	0.86	0.874	
7/30	1	0.89	0.89	0.898			0	0.86	0.86	0.874	
7/31	0	0.89	0.89	0.898				0.86	0.86	0.874	
8/1	0.88	0.88	0.888					0.85	0.85	0.851	
8/2	0	0.88	0.88	0.888		24.8	5	1.84	2.92	0.779	
8/3	2	0.86	0.86	0.868		24.1	5	1.84	1.94	0.187	
8/4	1	0.85	0.85	0.858		21.9	8	1.67	1.88	0.152	
8/5	1	0.89	0.89	0.898		24.2	1	0.23	1.46	0.157	
8/6	24.3	0	2.43	1.63	0.994		18.2	2	0.98	0.99	0.169
8/7	24.1	0	2.88	0.83	0.894			0.88	0.89	0.163	
8/8	28.4	0	1.89	0.68	0.894		21.9	22	4.61	0.92	1.282
8/9			0.88	0.88	0.894		24.1	16	3.32	1.38	0.382
8/10	24.2	7	1.45	0.90	0.158			0.88	1.38	0.182	
8/11	22.8	1	0.21	0.75	0.153		47.9	16	1.67	1.38	0.472
8/12	23.9	1	0.21	0.65	0.163		21.9	7	2.44	1.39	0.521
8/13	24.3	2	0.41	0.61	0.180		9.1	3	1.65	1.44	0.528
8/14	23.9	5	1.85	0.67	0.214			0.88	1.48	0.528	
8/15	23.8	4	1.84	0.69	0.248		16.1	4	1.24	1.39	0.551
8/16	24.8	2	0.42	0.66	0.253		21.9	8	0.88	1.27	0.551
8/17	24.2	2	0.41	0.64	0.278		21.9	4	0.84	1.24	0.573
8/18	23.8	1	0.21	0.68	0.286		21.9	2	0.42	1.18	0.584
8/19	24.8	6	1.25	0.65	0.331			0.88	1.18	0.584	
8/20	24.2	7	1.45	0.72	0.383		33.9	1	0.13	1.88	0.590
8/21	24.8	7	1.46	0.76	0.406			0.88	1.88	0.590	
8/22	24.8	5	1.84	0.78	0.474		24.8	8	0.88	1.81	0.598
8/23	23.9	2	0.42	0.76	0.489		24.8	2	0.42	0.98	0.601
8/24	23.9	2	0.42	0.74	0.504		24.5	11	2.24	1.65	0.603
8/25	24.2	3	0.62	0.73	0.526		21.7	5	1.05	1.85	0.691
8/26	24.1	4	0.83	0.74	0.556		21.7	4	0.84	1.84	0.713
8/27	24.8	2	0.42	0.72	0.571		9.8	3	1.53	1.85	1.734
8/28	23.9	1	0.21	0.78	0.579			0.88	1.05	0.730	
8/29	18.8	0	0.86	0.68	0.579		24.8	3	0.63	1.83	0.747
8/30			0.88	0.68	0.579		24.8	2	0.42	1.08	0.758
8/31	21.1	8	1.95	0.74	0.639		24.1	3	0.62	0.98	0.775
8/32	24.2	7	1.45	0.77	0.692		24.1	5	1.04	0.99	0.803
8/33	23.9	3	0.63	0.77	0.714		21.9	5	1.05	0.99	0.811
8/34	23.9	3	0.63	0.76	0.737		18.2	0	0.88	0.97	0.831
8/35	24.1	6	1.24	0.78	0.782			0.88	0.97	0.831	
8/36	24.8	4	0.81	0.78	0.812		21.9	3	0.63	0.96	0.848
8/37	23.5	18	2.13	0.83	0.887		21.8	1	0.22	0.93	0.854
8/38			0.88	0.83	0.887		25.8	1	4.28	0.91	0.858
8/39	47.8	15	1.57	0.88	1.080		24.2	9	1.86	0.94	0.918
8/40							24.8	3	1.93	0.94	0.938
8/41							24.8	1	0.21	0.92	0.944
8/42								0.88	0.92	0.944	
8/43							28.8	18	1.84	0.93	1.066
Totals	731.3	133	26.44			Total	189.3	178	35.32		
						Mean day of catch 8/24.					
						Mean day of catch 8/12.					

Appendix Table 2. (p. 4 of 4).

coho salmon catch, 1989
counts begin the day the
tenth salmon was caught

Date	Hours	Catch	CPUE	Cum. CPUE	CP(C)
7/10					
7/11					
7/12					
7/13		1	0.21		
7/14			0.00		
7/15			0.00		
7/16			0.00		
7/17			0.00		
7/18		1	0.21		
7/19			0.00		
7/20			0.00		
7/21		1	0.21		
7/22			0.00		
7/23			0.00		
7/24			0.00		
7/25			0.00		
7/26		2	0.42		
7/27	24.5	5	1.02	1.02	0.03
7/28	23.7	1	0.21	0.62	0.03
7/29	10.2	2	0.98	0.68	0.04
7/30	0.0	0	0.00	0.68	0.04
7/31	24.3	2	0.41	0.60	0.06
8/01	23.8	4	0.84	0.66	0.08
8/02	24.5	5	1.02	0.72	0.10
8/03	23.8	3	0.63	0.71	0.12
8/04	24.0	5	1.04	0.76	0.15
8/05	10.2	5	2.45	0.85	0.18
8/06	0.0	0	0.00	0.85	0.18
8/07	24.3	1	0.21	0.77	0.18
8/08	23.9	4	0.84	0.78	0.20
8/09	24.2	6	1.24	0.82	0.24
8/10	23.8	6	1.26	0.86	0.27
8/11	0.0	0	0.00	0.86	0.27
8/12	33.8	3	0.44	0.82	0.29
8/13	0.0	0	0.00	0.82	0.29
8/14	24.0	21	4.38	1.06	0.40
8/15	24.2	14	2.89	1.18	0.48
8/16	24.2	10	2.07	1.24	0.54
8/17	23.6	7	1.48	1.25	0.57
8/18	0.0	0	0.00	1.25	0.57
8/19	32.8	10	1.52	1.27	0.63
8/20	0.0		0.00	1.27	0.63
8/21	24.0	2	0.42	1.23	0.64
8/22	24.0	4	0.83	1.21	0.65
8/23	23.5	5	1.06	1.20	0.69
8/24	0.0		0.00	1.20	0.69
8/25	34.5	5	0.72	1.17	0.72
8/26	25.0	4	0.60	1.16	0.74
8/27	0.0		0.00	1.16	0.74
8/28	24.0	8	1.67	1.18	0.78
8/29	25.8	9	1.74	1.20	0.83
8/30	22.8	4	0.88	1.19	0.86
8/31	23.7	4	0.84	1.18	0.88
9/01	23.8	6	1.26	1.18	0.91
9/02	11.8	1	0.42	1.17	0.92
9/03	0.0		0.00	1.17	0.92
9/04	23.3	2	0.43	1.14	0.93
9/05	24.0	2	0.42	1.12	0.94
9/06			0.00	1.12	0.94
9/07	48.3	3	0.31	1.07	0.96
9/08	23.7	2	0.42	1.05	0.97
9/09	24.0	2	0.42	1.04	0.98
9/10	24.0	2	0.42	1.02	0.99
9/11	23.8	0	0.00	0.99	0.99
9/12	24.0	2	0.42	0.98	1.00
Totals	925.8	186	39.45		
				Mean day of catch	8/16

Appendix Table 1. (p. 3 of 4).

pink salmon catch, 1987
counts begin the day the
first salmon was caught

pink salmon catch, 1988
counts begin the day the
tenth salmon was caught

Date	Hours	CLM				Hours	CLM			
		Catch	CPUE	CPUE	CP(C)		Catch	CPUE	CPUE	CP(C)
6/14						1	8.66	8.00	8.691	
6/15						2	8.66	8.00	8.693	
6/16						2	8.66	8.00	8.696	
6/17							8.66	8.00	8.696	
6/18						1	8.66	8.00	8.697	
6/19							8.66	8.00	8.697	
6/20							8.66	8.00	8.697	
6/21						24.3	32	6.58	7.82	8.844
6/22						23.9	28	4.18	6.82	8.867
6/23						24.0	35	7.29	6.44	8.107
6/24						24.2	22	4.55	5.96	8.132
6/25						23.7	18	2.11	5.20	8.144
6/26						9.8	16	8.89	5.46	8.162
6/27							8.89	5.46	8.162	
6/28						24.1	54	11.28	6.36	8.225
6/29							8.66	6.36	8.225	
6/30						53.8	53	5.88	6.81	8.286
7/01						19.1	38	9.95	6.35	8.329
7/02						24.2	72	14.88	7.17	8.412
7/03						18.3	27	13.11	7.41	8.444
7/04							8.66	7.41	8.444	
7/05						24.2	38	7.85	7.45	8.487
7/06						24.8	32	6.67	7.39	8.524
7/07						24.0	23	4.79	7.20	8.551
7/08						24.1	29	6.82	7.12	8.584
7/09	24.1	2	8.41	8.41	8.022	23.9	27	5.65	7.83	8.613
7/10	24.8	1	8.21	8.31	8.934	11.6	22	9.48	7.18	8.641
7/11	24.3	5	1.93	0.55	0.899			8.66	7.18	8.641
7/12	11.2	1	0.45	0.54	0.101	24.4	115	23.57	8.86	8.773
7/13			0.66	0.54	0.101	23.9	52	10.88	8.22	8.833
7/14	23.3	1	0.21	0.47	0.112	23.9	36	7.53	8.18	8.874
7/15	23.9	6	0.99	0.38	0.112	23.9	14	2.93	7.92	8.891
7/16	48.4	18	1.63	0.56	0.225	18.8	7	3.24	7.55	8.989
7/17	23.8	2	0.42	0.54	0.247			8.66	7.55	8.989
7/18	18.9	6	0.68	0.51	0.247	24.1	14	2.90	7.34	8.925
7/19			0.69	0.51	0.247	24.0	12	2.58	7.14	8.939
7/20	24.2	19	3.93	0.86	0.461	24.8	6	1.25	6.98	8.946
7/21	23.8	22	4.62	1.28	0.708	24.2	8	1.65	6.70	8.955
7/22	24.8	18	3.75	1.42	0.818	24.8	6	1.25	6.49	8.962
7/23	24.3	3	0.62	1.35	0.944	25.4	3	0.59	6.27	8.965
7/24	23.8	4	0.84	1.32	0.989			8.66	6.27	8.965
7/25	18.5	9	0.88	1.28	0.989			8.66	6.27	8.965
7/26			0.88	1.28	0.989			8.66	6.27	8.965
7/27	23.4	0	0.68	1.28	0.989	22.7	6	1.76	6.12	8.975
7/28	24.3	1	8.21	1.13	1.000	24.3	5	1.81	5.95	8.988
7/29						23.6	4	0.85	5.79	8.985
7/30						18.3	1	0.49	5.71	8.986
7/31							8.66	5.71	8.986	
8/01						24.8	8	0.88	5.54	8.986
8/02						24.0	1	0.21	5.38	8.987
8/03						24.1	1	0.21	5.00	8.988
8/04						23.9	2	0.42	5.89	8.991
8/05						24.2	1	0.21	4.95	8.992
8/06						18.2	1	0.49	4.98	8.993
8/07							8.66	4.98	8.993	
8/08						23.9	2	0.42	4.79	8.995
8/09						24.1	1	0.21	4.66	8.997
8/10							8.66	4.66	8.997	
8/11						47.9	2	0.21	4.44	8.999
8/12						23.9	8	0.68	4.34	8.999
8/13						9.1	6	0.68	4.38	8.999
8/14							8.68	4.38	8.999	
8/15						16.1	6	0.68	4.23	8.999
8/16						23.9	1	0.21	4.14	1.008
8/17						23.9	6	0.68	4.05	1.008
8/18						23.9	6	0.68	3.96	1.008
8/19							8.68	3.96	1.008	
8/20						33.9	8	0.68	3.84	1.008

Total 392.2 89 7/23
Mean day of catch 7/23

Total 1130.2 868 7/05
Mean day of catch 7/05

Appendix Table 3. (p. 4 of 4).

pink salmon catch, 1989
counts begin the day the
tenth salmon was caught

Date	Hours	Catch	CPUE	Cum. CPUE	CP(C)
6/07					
6/08					
6/09					
6/10					
6/11					
6/12					
6/13					
6/14					
6/15					
6/16					
6/17					
6/18					
6/19					
6/20					
6/21		I	0.21		
6/22		2	0.42		
6/23		0	0.00		
6/24		1	0.45		
6/25			0.00		
6/26		0	0.00		
6/27		1	0.21		
6/28		I	0.21		
6/29	24.0	7	1.46	1.46	0.01
6/30			0.00	1.46	0.01
7/01	34.0	15	2.16	1.87	0.02
7/02	0.0		0.00	1.87	0.02
7/03	24.1	1	0.21	1.39	0.02
7/04	24.0	2	0.42	1.17	0.02
7/05	23.9	3	0.63	1.07	0.02
7/06	24.1	5	1.04	1.07	0.03
7/07	24.0	2	0.42	0.93	0.03
7/08	10.0	0	0.00	0.93	0.03
7/09	0.0		0.00	0.93	0.03
7/10	24.1	12	2.49	1.10	0.04
7/11	23.9	12	2.51	1.24	0.05
7/12	24.0	16	3.33	1.44	0.06
7/13	24.0	16	3.33	1.60	0.07
7/14	24.0	34	7.08	2.02	0.10
7/15	10.2	56	27.45	2.84	0.14
7/16	0.0		0.00	2.84	0.14
7/17	14.0	80	28.57	3.32	0.21
7/18	24.2	117	24.17	5.29	0.30
7/19	24.1	191	39.63	5.11	0.45
7/20	24.1	189	39.21	7.13	0.60
7/21	24.0	144	30.00	8.42	0.72
7/22	10.0	54	27.00	8.84	0.75
7/23	0.0		0.00	8.84	0.75
7/24	28.8	66	11.46	9.00	0.82
7/25	10.3	32	0.74	8.99	0.84
7/26	23.8	55	11.55	9.11	0.89
7/27	24.5	66	13.27	9.30	0.94
7/28	23.7	27	5.70	9.15	0.98
7/29	10.2	16	7.35	9.11	0.97
7/30	0.0	0	0.00	9.11	0.97
7/31	24.3	5	1.03	8.78	0.97
8/01	23.8	8	1.69	8.51	0.98
8/02	24.5	6	1.22	8.23	0.99
8/03	23.8	5	1.05	7.97	0.99
8/04	24.0	0	0.00	7.70	0.99
8/05	10.2	1	0.49	7.59	0.99
8/06	0.0	0	0.00	7.59	0.99
8/07	24.3	3	0.62	7.36	0.99
8/08	23.9	4	0.84	7.15	1.00
8/09	24.2	2	0.41	6.94	1.00
8/10	23.8	2	0.42	6.74	1.00
8/11	0.0	0	0.00	6.74	1.00
8/12	33.8	0	0.00	6.47	1.00
8/13	0.0	0	0.00	6.47	1.00
8/14	24.0	1	0.21	6.29	1.00
Totals		853.4	1253	308.65	
Mean day of catch 7/20					

